



# THE SCIENCE EDUCATION REVIEW

Ideas for enhancing primary and high school science education

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## Did you Know?

### *Annoying Mobile Phone Users*

There is no need to speak so loudly, and annoy those around us, when using a mobile phone. We tend to do so because we are used to using landline phones which employ a technology called side tone, where part of the signal from your mouthpiece is sent to your earpiece. Because we can hear our own voice, we tend to adjust our voice level to match our listening level. However, mobiles don't have side tone. Because we can't hear what we are saying in the earpiece, we tend to think we need to speak louder. Another reason for mobile users speaking loudly is that the earpiece is not being held directly to the ear. Because the sound from the earpiece then sounds softer than it really is, the user thinks he or she needs to shout.

In any case, shouting into a mobile phone makes no difference to what is heard by a receiver, because mobiles typically have a technology called automatic gain control (AGC). If you shout, the AGC reduces the signal from the mouthpiece, and if you whisper, the AGC amplifies this signal. Speaking with a normal voice level, during which time the AGC will be largely inactive, produces the same listening effect for the receiver. To reduce the effect of background noise, simply bring the mobile phone mouthpiece closer to your mouth (which increases the level of your voice relative to the background level) and/or wrap a hand around the mouthpiece to shield it from the background noise.

*Source*

Kruszelnicki, K. (2006). *It ain't necessarily so . . . bro*. Sydney: HarperCollinsPublishers.

## The Magic Liquid: A Science Story About Acids and Bases

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### *Abstract*

A science story can teach pupils about scientific phenomena in an indirect way. While this story involves animals, the danger that it exposes applies equally to humans.

## ***Introduction***

Children of all ages find stories interesting, and stories can provide a good way to teach children the content of different subjects and to explain phenomena (Howe, 1993; Huck, 2003). A story can create enthusiasm in children and stimulate them to learn. It can also promote the functional perception of information and improve the skills of scientific thinking among children (Bliss, 1995).

The teacher is advised not to exaggerate the imaginative points in a story, and to ask clever questions at the end that lead to appropriate conclusions. The teacher's role is highly significant in guiding children and assisting them to understand the events and theme of a story through effective ways of thinking.

The following story provides a way for students to learn about materials that look similar, and is an alternative to the approach that uses the senses of taste or smell (Hugerat & Basheer, 2001). The focus is the scientific idea that not all materials having a similar appearance are necessarily the same. A person must therefore be very careful.

## ***The Story***

### **The Magic Liquid**

The farm of uncle Sami is beautiful. It is green all over, with lots of colored flowers. In the farm, a dog, a cat, ducks, geese, and hens live peacefully. Uncle Sami wakes up early, works hard in his farm, cultivates the land, waters the vegetables, and feeds the animals.



One day, uncle Sami felt severe pain in his feet that made him stay in bed. The dog called all the farm animals for a meeting in order to help uncle Sami in running the farm jobs. The hen Lulo gathered her chicks and said: "I am going to look for grain in the surrounding fields. Please, stay inside the farm with the dog and the cat." She pointed to the troublesome chick and said: "You make sure to stay with your siblings and near the pen." The chicks replied: "We promise you, Mammy."

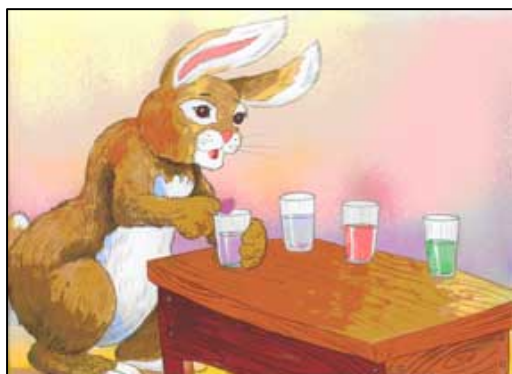
The chicks began to hop around, and the cat started to meow. Suddenly, the cat noticed that the troublesome chick was not present. She rushed to look for him. She heard a cry. "It is the troublesome chick!" the cat said. She went toward the sound and there he was. The troublesome chick was coughing and crying: "Ku . . Ku . . Ku." "What happened to you?" the cat asked. "I felt thirsty; I went to look for water and . . . ." Before he could even finish his sentence, he fell on the ground.





"Help! Help!" the cat screamed. Everyone in the farm hurried to help. They knew the chick was in some kind of danger. The rooster, who was a doctor, came over and examined him. He recommended transferring the chick to the hospital. The hen felt very sad and prayed to God to be merciful for her little chick. The chick remained 3 days in the intensive care unit.

After 1 whole week, he recovered and came home safely to the farm. Everyone in the farm came to congratulate the little chick on his recovery. Dr Rooster stood and asked everyone to pay attention. He brought three glasses filled with clear liquid and asked: "What do you see inside the glasses?"



All of them were surprised by his question. They began to whisper between themselves: "Of course, water! All the glasses are filled with water!" Dr Rooster then asked the rabbit to put some leaves of red cabbage in a glass filled with boiling water. The color of the liquid turned purple, and Dr Rooster poured a few drops of the purple liquid into the three glasses. Wow! Everyone screamed loudly. "Purple . . . red . . . green!" Dr Rooster is a great magician.

Dr Rooster replied in a loud voice: "No, no, I am no magician. The cabbage's purple liquid is an indicator. It shows the nature of the clear liquid. Look carefully! The purple color has not changed in the first glass, because it has water in it and water is neutral. But it has changed in the other two glasses. This shows that the liquids in the other two glasses are not water. We obtained a red color in the acidic liquid (vinegar) and a green color in the alkaline liquid (baking soda solution). Therefore, we must not be deceived and think that every clear liquid is water. This is what happened to our friend, the troublesome chick. The clear liquid he drank was not water. It was one of the dangerous pesticides that Uncle Sami uses on the farm." Dr Rooster added in a firm voice: "My dear friends, you must be very careful when you drink, because **not every clear liquid is water!**"



## ***Using the Story***

The story provides an indirect way for children to learn new information. The presentation of this story, which warns against drinking any clear liquid, could be tailored to fit a wide range of ages; 5- to 15-year-olds, say. The story might also form the basis of a game to be played or a drama to be acted out in the classroom.

Some children will also learn that it is not so good to be like the troublesome chick, and that you should therefore listen to the advice of adults and be careful not to touch strange or unknown things. Some will appreciate the good role model of Dr Rooster in helping other people.

The science story can activate the imagination of the child and support new elements of imagination. In this story, in which the animals behave like people, the child makes the connection between imagination and reality. Children of all ages adore stories, and science stories are a valuable tool for teaching aspects of scientific knowledge.

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# **The “Magical” Sphere: Uncovering the Secret**

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## ***Abstract***

A red sphere is seen at the bottom of a sealed glass tube filled with a colorless, transparent liquid. Holding the tube for a short period makes the sphere rise slowly from the bottom until it finally floats on the surface of the liquid. Instructions for preparing the demonstration are given, together with an explanation of the phenomenon. A similarity with the Galileo thermometer is pointed to. An example of guiding the discussion with students in the course of uncovering the secret behind the behaviour of the sphere is also given in the form of Socratic dialogue, relying on carefully selected questions that stimulate the students to think in a scientific way. The latter may also serve as an example of a teacher's approach during inquiry-based learning.

## ***The “Magical” Sphere Demonstration***

A sealed tube containing a transparent, colourless liquid was fastened on a stand. A red sphere could be seen at the bottom of the tube (Figure 1a). Students were invited to observe it for a minute or so.

The “magician” (instructor) approached the demonstration table and announced that he will make the sphere float in the liquid. He placed his hand over the lower part of the tube, where the red sphere was at rest, and held it for about 15 seconds (Figure 1b). The magician removed his hand from the tube. The audience witnessed the red sphere moving slowly through the colourless